

WHAT IS CLAIMED IS:

1. An air fuel injection engine, comprising:

an injector having a fuel injection valve for injecting fuel and an air fuel injection valve for directly injecting fuel together with compressed air into a combustion chamber;
and

an injector housing for holding and securing said injector to an engine body,

wherein said injector housing is formed integrally with a head cover which forms part of said engine body.

2. The air fuel injection engine according to claim 1, wherein at least part of a fuel supply passage and compressed air supply passages for supplying fuel and compressed air to said injector housing, respectively, is provided directly in said head cover.

3. The air fuel injection engine according to claim 1, further comprising:

intake valves and an exhaust valve disposed on a cylinder head which forms part of said engine body; and

a camshaft disposed at a position away from said cylinder head and said head cover and forming part of a valve system which drives said intake valves and exhaust valve, and is formed as a four-cycle engine.

4. The air fuel injection engine according to claim 3, wherein said injector is disposed on a cylinder axial line C, and on a projection view to a plane perpendicular to said cylinder axial line C, a first intake valve port which can be closed up by the first intake valve and an exhaust valve port which can be closed up by said exhaust valve are disposed on the opposite sides on said injector while a second intake valve port which can

be closed up by the second intake valve is disposed on one side of said injector on a straight line L2 substantially perpendicular to a straight line L1 interconnecting said first intake valve port and said exhaust valve port.

5. The air fuel injection engine according to claim 1, wherein at least part of a compressed air supply passage for supplying compressed air to said injector is provided directly in said head cover.

6. A air fuel injection engine according to claim 1, further comprising:
a cylindrical knock pin inserted at the opposite end portions thereof in a cylinder head, which cooperates with said head cover to support said injector, and said head cover, the knock pin extending across mating surfaces of said cylinder head and said head cover; and

passages provided directly in said cylinder head and head cover, respectively, and forming at least part of said compressed air supply passage communicates through said knock pin.

7. The air fuel injection engine according to claim 6, wherein an orifice is formed in said knock pin.

8. The air fuel injection engine according to claim 1, when the head cover is coupled to the cylinder head, an end portion of the injector housing contacts with a rear end of the air fuel injection valve, and a clamping plate is fastened to a rear end of the injector housing and cooperates with the injector housing to hold a rear end portion of the fuel injection valve therebetween.

9. The air fuel injection engine according to claim 8, wherein an annular fuel chamber is formed between the injector housing and the fuel injection valve such that it communicates with the inside of the fuel injection valve.

10. The air fuel injection engine according to claim 4, wherein the camshaft is supported at the opposite end portions thereof for rotation by a cylinder block and a cover, the cover being fastened to the cylinder block such that it forms an outer side face of a second valve chamber.

11. The air fuel injection engine according to claim 6, wherein an O-snap ring is held between the mating surfaces of the cylinder head and the head cover and surrounds the knock pin.

12. The air fuel injection engine according to claim 7, wherein a relief valve is mounted on the cylinder head and connected to one of the passages on the upstream side with respect to the orifice.

13. The fuel air injection engine according to claims 5, wherein the compressed air passage, passes in the proximity of the exhaust port, so that the compressed air circulating along the compressed air supply passage can be warmed with the heat of exhaust gas circulating through an exhaust port.

14. A fuel injection apparatus, comprising:
an injector having a fuel injection valve for injecting fuel and an air fuel injection valve for directly injecting fuel together with compressed air into a combustion chamber;
and

an injector housing for holding and securing said injector to an engine body; and
a clamping plate fastened to a rear end of the injector housing, the clamping plate cooperating with the injector housing to hold a rear end portion of the fuel injection valve therebetween,

wherein said injector housing is formed integrally with a head cover which forms part of said engine body.

15. The fuel injection apparatus according to claim 14, wherein at least part of a fuel supply passage and compressed air supply passages for supplying fuel and compressed air to said injector housing, respectively, is provided directly in said head cover.

16. The fuel injection apparatus according to claim 14, further comprising:
intake valves and an exhaust valve disposed on a cylinder head which forms part of said engine body; and

a camshaft disposed at a position away from said cylinder head and said head cover and forming part of a valve system which drives said intake valves and exhaust valve.

17. The fuel injection apparatus according to claim 15, wherein said injector is disposed on a cylinder axial line C, and on a projection view to a plane perpendicular to said cylinder axial line C, a first intake valve port which can be closed up by the first intake valve and an exhaust valve port which can be closed up by said exhaust valve are disposed on the opposite sides on said injector while a second intake valve port which can be closed up by the second intake valve is disposed on one side of said injector on a straight line L2 substantially perpendicular to a straight line L1 interconnecting said first

intake valve port and said exhaust valve port.

18. The fuel injection apparatus according to claim 14, wherein at least part of a compressed air supply passage for supplying compressed air to said injector is provided directly in said head cover.

19. The fuel injection apparatus according to claim 14, further comprising:

a cylindrical knock pin inserted at the opposite end portions thereof in a cylinder head, which cooperates with said head cover to support said injector, and said head cover, the knock pin extending across mating surfaces of said cylinder head and said head cover; and

passages provided directly in said cylinder head and head cover, respectively, and forming at least part of said compressed air supply passage communicates through said knock pin.